SPARC Activity Report 2019

(SOLARIS-HEPPA)

I. Achievements and Plans

* What has your activity achieved over the past year?

- *Substantial advances in SOLARIS-HEPPA CCMI analysis (WG1-4), e.g., definition of predictors, completion of regression analysis. Interpretation of results and discussion of potential methodological improvements are currently pursued.*

- *Substantial advances in the evaluation of atmospheric impacts of MEE ionization (WG5): assessment of different ionization datasets finished (paper draft underway).*

- *Write-up of CCMI analysis overview paper currently underway (planned to be submitted early 2020).*

- *We held the SOLARIS-HEPPA working group meeting in Granada, Spain, 18-19 September 2019.*

* Have you completed any major deliverables e.g. reports or reviews or reached any major milestones?

- *SOLARIS-HEPPA CCMI analysis overview paper will be submitted shortly (see above).*

- *We have submitted a report on the Granada Working Group meeting for publication in the SPARC Newsletter.*

- *White paper on NTC predictability (including the solar perspective) published in Nature Climate Perspectives (Kushnir et al., 2019, https://doi.org/10.1038/s41558-018-0359-7)*

* How do those achievement tie into the three main themes of SPARC?

- ***Atmospheric dynamics and predictability:*** *Dynamical coupling mechanisms for solar signal transfer and interactions with internal variability modes, as well as decadal predictability related to solar forcing are at the core of SOLARIS-HEPPA activities.*

- ***Chemistry and Climate:*** *Improved process understanding of solar-chemistry interactions is a major objective of current activities (i.e., CCMI solar analysis).*

- ***Long-term records for climate understanding****: The critical assessment and methodological improvements of time series analysis as pursued within WG4 will be a valuable contribution to a better characterization of long-term climate records in general.*

* What does your activity plan to do over the coming year?

- *Finalization of CCMI solar analysis*

- *HEPPA-SOLARIS workshop, Bergen, June 2020*

* What deliverables (e.g. reports, review papers) do you plan to complete?

- *We plan to submit the CCMI solar analysis overview paper (see above) and several specific papers related to individual WG activities.*

* What is your vision for the new SPARC strategy?

- *Current SPARC themes and related activities fit very well into the recently defined WCRP strategy goals I-III. The new SPARC strategy could make more emphasis in fostering engagement with society (compliant with WCRP strategic goal IV), particularly regarding the creation of awareness of stratospheric influences on regional climate, as well as putting more emphasis on stratospheric implications for S2S and decadal prediction. Infrastructure aspects (i.e. the role of the SPARC data centre) could be reinforced, specifically regarding the archiving of sustained observations and reference data sets.*

* Which direction would you like to see SPARC move forward to?

- *Integration of stratosphere-troposphere research and the importance of stratospheric chemistry to detect and attribute climate variability and predictability, which means to more closely link and work together with the other core programs (CLIVAR, GEWEX, CLIC) – definition of overarching questions that can only be tackled together, too much side by side work.*
- *Put more emphasis to "whole atmosphere" research by extending the focus to the mesosphere-lower thermosphere region (including observational and modelling aspects). Benefits are integrated process understanding of a coupled whole atmosphere system, as well as implications for predictability (upper boundary).*
- *More dialogue with different stakeholders (public, policy makers, etc.) to push SPARC themes forward and make it more visible*

* What are the main scientific questions that should be addressed in the next 5-10 years?

- *Attribution and detection of climate variability and trends in particular on a decadal scale, to improve near-term climate predictions and to fill the gap between weather and seasonal predictions and IPCC-type climate projections since this is relevant to society (people would like to know how the weather will look like in 2030, 2040, 2050)*

II. Resources

* What workshops have you planned for the coming year and what level of WCRP/SPARC funding do you require to support those workshops?
- *HEPPA-SOLARIS workshop, Bergen, June 2020*

* For what do you intend to use any allocated funding?

- *Travel support of early career scientists*

* What funding proposals does your activity have in the works?

- *Mainly national funding opportunities. A proposal for a large-scale project within H2020, enclosing a large fraction of the international SOLARIS-HEPPA community, was submitted in 2019 but did not succeed.*

* What resource issues is your activity facing?

- *The dependence of activity progress on individual national funding is generally an issue, which could only be remedied by international joint funding opportunities.*

* Is there anything that the SSG can do to help?

- *No needs identified.*

III. WCRP Communications†

* What are the data issues/needs for your activity?

- *Data needs of SOLARIS-HEPPA have been identified in a dedicated white paper, available at the SPARC web page.*

* What are the modelling issues/needs for your activity?

- *As stated in other activity reports we think that a larger coordinated activity on defining the minimal requirements for radiative and photochemical schemes to adequately represent solar signals would be very valuable.*

IV. SPARC Programmatic Issues

* What can your activity contribute to the strategic goals formulated in the WCRP strategic plan?
* What needs to be formulated in the WCRP Implementation Plan to facilitate this contribution?

- *SOLRIS-HEPPA contributes to Goal 1 by advancing our understanding of processes and mechanisms in the atmospheric component of the climate system.*

- *SOLRIS-HEPPA contributes to Goal II by providing external forcing data sets, quantification of uncertainties, and assessment of their climate impact, thereby advancing capabilities of S2S and decadal prediction systems.*

- *SOLARIS-HEPPPA contributes to goal III by advancing our understanding of non-linear processes and internal variability, and of system sensitivities to the imposed forcing by the Sun, thereby reducing uncertainties in model predictions.*

* To which other SPARC or WCRP activities does your activity connect?

- *Strong links to WCRP/CMIP6 (solar forcing, DAMIP contributions), as well as WGCM and DCPP*

- *Strong links to CCMI (focus of current WG activities) and SSiRC (joint effort for natural, i.e. solar +volcanic, forcing impacts)*

- *Strong links to WCRP-NTCP activity (see white paper in Nature Climate Perspectives, Kushnir et al., 2019)*

- *Strong links to LOTUS and ATC activities (synergies respect to O3 and T signal detection)*

- *Further links to SNAP (decadal predictability), S-RIP (solar influences in reanalysis, particularly USLM), Data assimilation, TUNER (observational error quantification)*

* Should you be thinking about joint workshops?

- *In principle, we highly support the idea of joint workshops. Opportunities should be assessed on an individual basis.*

* Can the SSG do anything to help foster better connections between your activity and other SPARC/WCRP activities?

- *No needs identified.*

* Has your activity contributed in any way to SPARC's capacity development effort?

- *No active contribution during the past year.*

* Is there any way the SSG capacity development group can help you to do more?

- *No needs identified.*

* Is there anything else that the SSG can do to assist your activity in any way?

- *No needs identified.*

* Please also take this opportunity to revisit the material published for your activity on the SPARC web page. (Please communicate any required changes to the SPARC Project Office).

[†] Issues/needs in this context refers especially to those that may require WCRP engagement beyond SPARC.